Evaluation of Mammalian Stress and Inflammatory Response to a Novel Porphyrin

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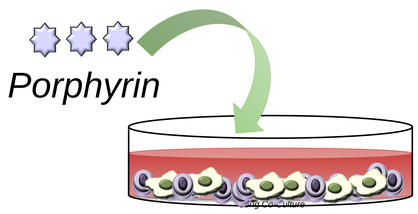
Rationale

- Bacteria can be found virtually everywhere and cause numerous life threatening diseases.
- The rise of antibiotic-resistant strains of bacteria has made the investigation of new therapeutics necessary.
- Resistant strains of *Pseudomonas aeruginosa* frequently infect the lungs and can be difficult to treat
- Porphyrins have potential to serve as a novel antibacterial agent, however, their safety in a mammalian environment needs to be evaluated

Methodology

- Co-culture lung model: Alveolar A549 epithelial cells and U937 macrophages grown at a 3:1 ratio
- Porphyrin: “Zeke” synthesized at UD by Dr. Shawn Swavey
- Safety evaluation: Introduce Zeke into the co-culture at multiple dosages, incubate for 24 hours, then assess the biological response of the cellular system



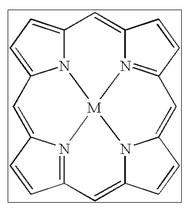


Figure 2: Novel Metal Porphyrin Structure

- Co-Culture Viability (MTS assay)
- Co-Culture Stress (ROS levels)
- Immune Response (Cytokine secretion via ELISAs)

Figure 1: Experimental Approach

Results

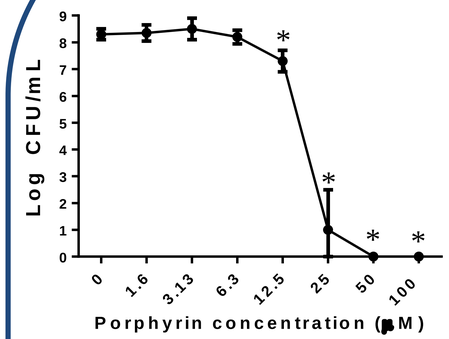


Figure 3: Antibacterial efficacy of Zeke on *P. aeruginosa*

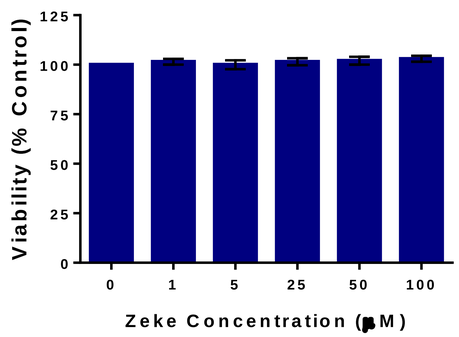


Figure 4: Co-culture cell viability following Zeke exposure

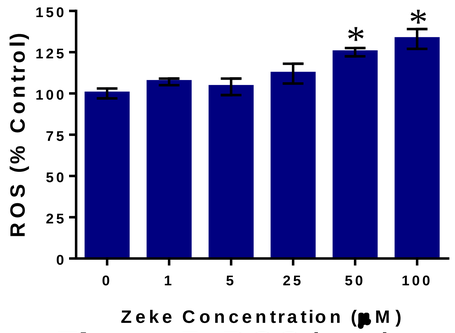


Figure 5: ROS levels at various Zeke concentrations

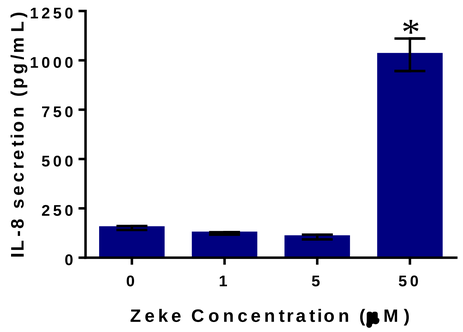


Fig 6: IL-8 cytokine secretion levels following Zeke exposure

No biologically relevant levels of IL-1β, IL-6, or TNF-α were detected

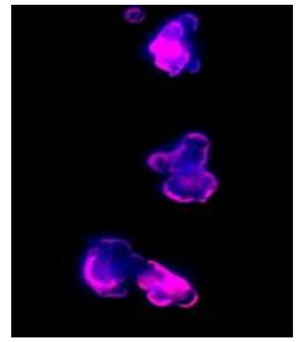


Figure 7: U937 cells underwent staining for actin (blue) and Zeke (pink) following Zeke exposure

* Indicates statistical significance from untreated control, n=3, p<0.05

Conclusions

- Zeke demonstrated strong antibacterial properties providing evidence that it is dark activated and can be highly effective against *P. aeruginosa*
- The safety of Zeke is supported by unchanged cell viability, minimal increase in cellular stress and no negative effect on the immune response